

Global Transmission Shocks of U.S. Monetary Policy on China's Housing Prices

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Abstract: The paper demonstrates that the monetary policy of the United States has important spillover effects to China. Based on the monthly data from January 2016 to April 2024, this paper establishes a VAR model to analyze the influence of U.S. monetary policy on China's real estate prices and its transmission channels, including interest rate, exchange rate, consumer confidence, and asset price. The results show that the impact of the Federal Funds Effective Rate on housing prices is very quick, reaching a maximum in the first month and continuing to have a positive impact over the long term. The Federal Funds Effective Rate and China's Loan Prime Rate have a positive impact on housing prices in the early stage, but then there is a change in impact direction. The Exchange Rate, Consumer Confidence Index and CSI 300 index all had positive spillover effects on housing prices in the early days. The variance decomposition analysis shows that the exchange rate channel plays the most significant role in causing China's real estate price fluctuations.

Keywords: Monetary policy, Transmission channels, Housing prices, U.S., China.

1. Introduction

In the globalized economic system, with United States being one of the world's largest economies, as well as the US dollar being the common currency of the world, its monetary policy changes have a profound influence on the economy around the world. After the pandemic, with rising energy prices and the recovery of the U.S. economy, the Fed's began a new round of interest rate hike cycle in March 2022. Meanwhile, China's real estate has been affected by the external impact of the epidemic and domestic policy regulation, and housing prices have been declining since 2022, accompanied by a series of real estate crash. Have the Fed's interest rate hikes had negative effects on real estate? How do these influences affect real estate asset prices in China?

As an important part of the national economy, the sustainable and healthy development of China's real estate market is of great importance to promoting the healthy and sustained development of China's economy. Analyzing the potential influence of the U.S. monetary policy on China's real estate market will help the government and market players formulate more effective countermeasures to ensure the stability of the real estate market. For investors, understanding the changes in the real estate market in different economic environments has a significant impact on investment decisions. This paper explores the transmission channels of the impact of U.S. monetary policy shocks on China's housing prices, which is helpful for understanding the mechanism of international economic fluctuations on China's macroeconomy and industry market.

2. Literature Review

U.S. monetary policy undoubtedly has side effects on other economies. Liu Mingming analyzes several representative transmission channels of U.S. monetary policy adjustment affecting China's stock market, including exchange rate, interest rate, short-term capital flow, and consumer expectation, and the significance of each channel, which

provides important guidance for this paper [1]. Wang Jiong studies short-term cross-border capital flows in China in the context of the Fed's new round of interest rate hikes in 2022, and found that except for the very beginning when China joined the WTO and the years before and after China's interest rate hike from 2010 to 2011, interest rate differentials react positively to short-term cross-border capital flows, and other times was mainly negative [2]. Ehrmann and Fratzscher find out that U.S. monetary policy plays a significant role in determine global equity markets. The transmission via U.S. domestic and foreign short-term interest rates and the exchange rate stands out in particular [3]. Mackowiak uses structural VAR to show that the interest rate and the exchange rate in emerging markets react to changes of U.S. monetary policy quickly and strongly [4]. These papers show that U.S. monetary policy has important international transmission shocks, particular to emerging markets. As the largest emerging market, China's asset prices are greatly affected by U.S. monetary policy, especially through interest rate and exchange rate fluctuations.

There is also research done on the transmission shocks of U.S. monetary policy on China's housing prices. Jia Shaolong uses the time series from 2007 to 2011 to analyze the influence of China and U.S. monetary policy adjustments on China's asset prices and finds that the U.S. monetary policy adjustments can cause fluctuations in China's stock market through interest rates channel and capital inflows channel, which in turn can affect China's real estate prices [5]. Liu Weijiang et al. find that the transmission channels of U.S. monetary policy shocks mainly include monetary policy channel and asset price channel, while the monetary policy channel refers to the fact that the U.S. monetary policy will affect China's monetary policy, and then affect the real estate market; the asset price channel means that China's stock market reacts to changes of the U.S. monetary policy, which in turn will affect real estate prices [6]. Wu Tianliang points out that the most direct influence of the Federal Reserve's interest rate hike on China's economy is that it will intensify capital outflows, accompanied by the depreciation of the yuan,

which will cause real estate prices to fall [7]. Liu Hebei uses the quarterly data from 2007 to 2024 to construct the BVAR model, and found that the Fed's interest rate hike can cause decline in real estate investment and commercial housing sales; while at the same time household debt will increase, thus causing housing prices to drop, resulting in a negative spillover effect. [8]

Clearly, U.S. monetary policy has important influence on China's asset price fluctuations, including China's housing prices, and this paper can further explore the transmission channels of the impact in depth, which can increase the diversity of such research.

3. Analysis of the Transmission Channels of U.S. Monetary Policy Shocks on China's Housing Prices

3.1. Interest Rate Channels

According to Krugman's theory of "The Impossible Trinity", a country cannot achieve free movement of capital, monetary policy independence, and a fixed exchange rate at the same time. In terms of capital flows, China faced severe capital outflow pressures during 2015 and 2016, leading to increased expectations of RMB depreciation. In response, the Chinese government has slowed down the opening up of its capital account and tightened its controls on capital outflows. As economic conditions stabilized, the Chinese government began to gradually ease restrictions on capital flows in 2018. In recent years, the Chinese government has encouraged foreign capital inflows and domestic enterprises to invest abroad, making Foreign Direct Investment (FDI) flows more balanced. Although China has not yet achieved complete convertibility of the capital account, capital controls are gradually being relaxed. For exchange rate, China currently implements a managed floating exchange rate system. While the adjustment of the US monetary policy will inevitably cause fluctuations in the RMB exchange rate, People's Bank of China can only choose to passively follow the Fed's policy changes to stabilize the exchange rate [6]. It's easy to see that U.S. monetary policy changes will inevitably influence Chinese currency exchange rate and the interest rate differential between the two countries, thus affecting the independence of China's monetary policy. So, it is obvious to see that the change of U.S. monetary policy will affect China's monetary policy, and thus affect China's real estate prices.

3.2. Exchange Rate Channels

Since 2016, the Federal Reserve has implemented two rounds of interest rate hikes, which have raised interest rates in the United States and strengthened the attractiveness of the dollar, leading to international capital flows to the United States and a relative depreciation of the yuan. On the one hand, the depreciation of the yuan has caused the overseas debt of real estate to rise, increasing the cost and pressure of debt repayment for real estate companies, which is a huge challenge them, and many companies have also experienced crashes [9]. Meanwhile, the appreciation of the U.S. dollar will lead to capital outflows from China, while capital outflows mean that investors will reduce their investment in China's real estate market, causing a decline in the real estate market demand, which in turn will exert downward pressure on housing prices. Therefore, the Fed's monetary policy can have some influence on China's real estate prices through the exchange rate channel.

3.3. Asset Price Channels

In the context of globalization, U.S. monetary policy of the will affect international capital flows, including capital from Chinese investors. When the Fed agrees to raise interest rates, more capital flows out from China into the United States, reducing the amount of money in the Chinese stock market. At the same time, China, as the third largest trading partner of the United States, responds to changes in U.S. monetary policy national wide. These responses are demonstrated in various industries across China, which in turn leads to stock price volatility. As China's two major investment channels, the stock market and real estate will inevitably affect each other. When the stock market is in a downturn, investors turn to real estate, causing house prices to rise. When stock prices rise, residents' wealth increases, which further drives demand for real estate, which in turn pushes up home prices [6]. Therefore, changes in U.S. monetary policy will cause volatility in China's stock market, which in turn will further affect China's housing prices.

3.4. Consumer Confidence Channels

Under the channel of consumer confidence, changes of U.S. monetary policy will significantly affect consumers' expectations of future economic development, thereby changing their consumption and investment behavior, and have a substantial impact on China's real estate market [1]. When the Fed announces its interest rate hike policy, Chinese market will have pessimistic expectations about the future economic conditions and the outlook for the real estate market; therefore, the outflow of short-term capital from China will accelerate, leading to tighter domestic financial conditions and higher financing costs. With the credit crunch and rising interest rates on loans, the cost of home buying has increased, dampening the demand for home purchases. At the same time, consumer confidence has suffered, and their expectations for future economic and income growth have become pessimistic, and they are more cautious about spending large amount of money. Expecting home prices to fall, potential buyers may postpone or cancel their home buying plans, and existing homeowners may also lose confidence in real estate investments, causing house prices to actually fall, which is a self-fulfilling prophecy.

However, changes in real estate asset prices are often caused by many factors, and only a few of the more representative transmission channels have been selected in this topic, but in fact, the transmission shocks of U.S. monetary policy on China's real estate asset prices extents far more than these channels mentioned in the paper. At the same time, the impact of each channel on the housing price is not unilateral; the price trend of real estate will in turn affect the channels analyzed in this paper.

4. Empirical Analysis

4.1. Sample Selection and Data Description

This paper uses the monthly data from January 2016 to April 2024 as the sample range. This period includes the two rounds of Federal Reserve's interest rate hikes in December 2015 and March 2022, which is helpful for studying the influence of the U.S. monetary policy, especially the contractionary monetary policy, on China's real estate prices. Variables used in this paper include: the year-on-year data of the newly constructed residential housing price index of 70 large and medium-sized cities to represent the housing price

(HP), U.S. Federal Funds Effective Rate (FFER), China's Loan Prime Rate (LPR), the exchange rate of Chinese yuan against US dollar (EXR), the stock CSI 300 Index (CSI300), and the Consumer Confidence Index (CCI). The data comes from the China Economy Information NET Statistics Database; the FFER data comes from Feds' official website, and the measurement software used is Stata 16. The descriptive statistics for each variable are shown in Table 1:

Table 1. Descriptive statistics of each variable

Variable	Obs	Mean	Std. Dev.	Min	Max
HP	100	104.4437	4.464032	95.87	112.57
FFER	100	1.7192	1.735689	.05	5.33
LPR	100	3.995	.3103843	3.45	4.3
EXR	100	6.7664	.2562098	6.3	7.18
CCI	100	110.382	14.30145	85.5	127
CSI300	100	3932.551	601.7128	2877.47	5351.97

4.2. Establishment and Empirical Results of VAR Model

This paper uses one of the classical models for analyzing monetary policy spillovers, the vector autoregression model (VAR), to analyze the influence of the U.S. monetary policy on China's housing prices. Suppose there are k time series variables y_1, y_2, \dots, y_k , VAR model can be expressed as:

$$y_t = c + A_1y_{t-1} + A_2y_{t-2} + \dots + A_p y_{(t-p)} + \varepsilon_t \quad (1)$$

where c is the constant term of $k \times 1$, ε_t is the error vector of $k \times 1$, and A_i is the coefficient matrix of $k \times k$. Next, six variables of HP, FFER, LPR, EXR, CSI300 and CCI will be brought into the VAR model, and the impulse response analysis and variance decomposition will be carried out.

Firstly, the ADF unit root test is performed on the six variables, and it is found that all the original data are not stationary, but they are stable in the state of first-order difference, and the results are shown in Table 2:

Table 2. ADF test table after first-order difference

Variables	T Statistic	1% Critical Value	5% Critical Value	10% Critical Value
DHP	-7.766	-3.513	-2.892	-2.581
DFFER	-4.591	-3.513	-2.892	-2.581
DLPR	-10.313	-3.513	-2.892	-2.581
DEXR	-5.894	-3.513	-2.892	-2.581
DCCI	-9.169	-3.513	-2.892	-2.581
DCSI300	-9.701	-3.513	-2.892	-2.581

At the same time, the cointegration test of the variables was carried out, where the six variables show a long-term stable relationship. Next, the optimal lag order of the var model should be determined before the model coefficient estimation and analysis.

Table 3. Optimal lag order test

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-666.743				.057026	14.163	14.2282	14.3243*
1	-604.625	124.24	36	0.000	.032959	13.6132	14.0694*	14.7422
2	-572.819	63.611	36	0.003	.036318	13.7015	14.5487	15.7983
3	-514.248	117.14*	36	0.000	.023094*	13.2263*	14.4646	16.2909
4	-497.985	32.525	36	0.635	.036539	13.6418	15.2712	17.6742

As can be seen from Table 3 above, according to the results of LR criterion, FPE criterion, and AIC Information Flow

criterion, the optimal lag order is lag 3.

Using the optimal lag order of lag 3, the stability of the constructed VAR model is tested by using the unit circle test method. The unit roots of lag 3 VAR model are all within the unit circle, and the test results are shown in Figure 1 below:

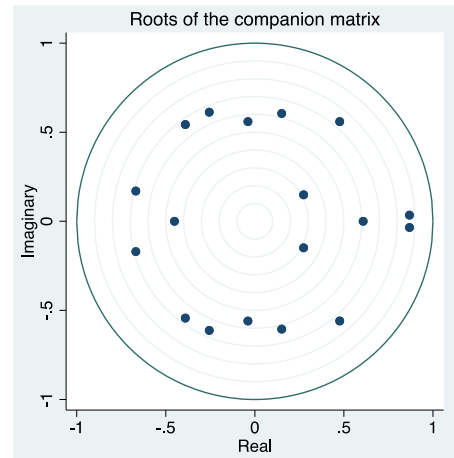


Figure 1. Unit circle test results

According to the unit circle test, the VAR model constructed in this paper is stationary. Therefore, analysis of housing price changes in China based on the impulse response function is continued.

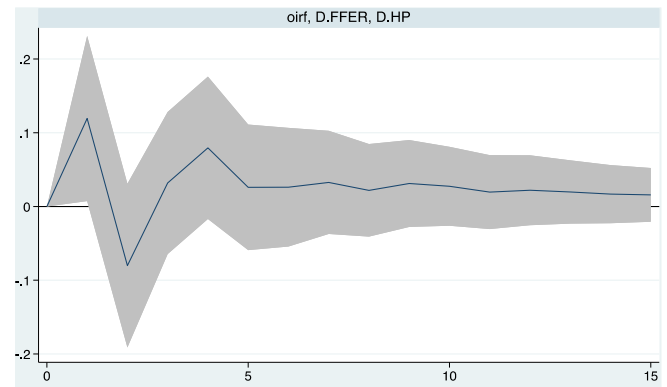


Figure 2. The response of HP to the shock of FFER

Figure 2 shows the impulse response of China's housing prices when there is a 1 standard deviation shock to the Federal Funds Effective Rate. In Figure 2, the initial Federal Funds Effective Rate has a strong positive impact on China's real estate prices, achieving its maximum in the first period, and turning negative in the second period, indicating that the impact of the Federal Funds Effective Rate on housing prices in the early stage is unstable. After the third period, the shock turns into a positive shock, and remains a weak positive shock for the long term. It's easy to see that the impact of the Federal Funds Effective Rate on housing prices plays a more important role in the short term, and weaker in the long term.

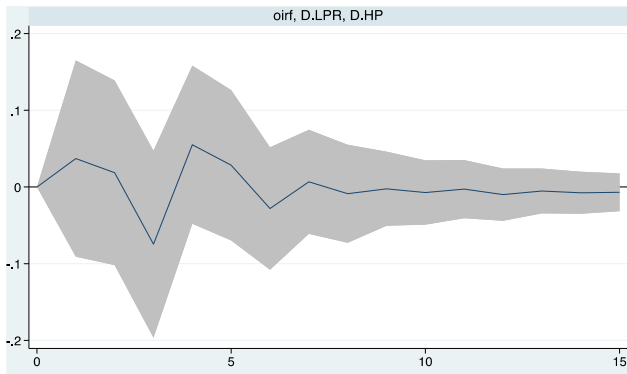


Figure 3. The response of HP to the shocks of China's LPR

Figure 3 illustrates the impact of China's Loan Prime Rate on China's housing prices. In Figure 3, the Loan Prime Rate had a weak positive impact on housing prices in the first, second, fourth and fifth periods, and turned negative in the third period and reached the maximum impact value, and then maintained a weak negative impact from the eighth period to the later period, and finally tended to zero.

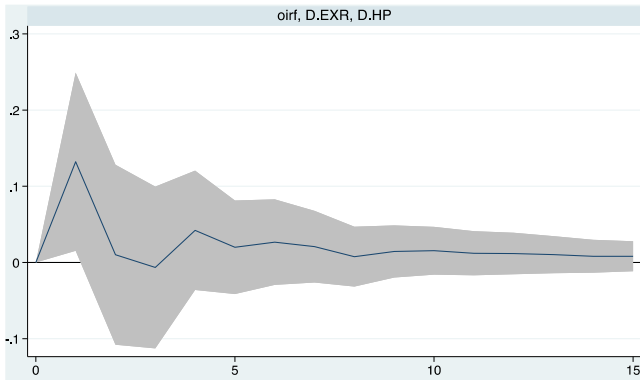


Figure 4. The response of HP to EXR shocks

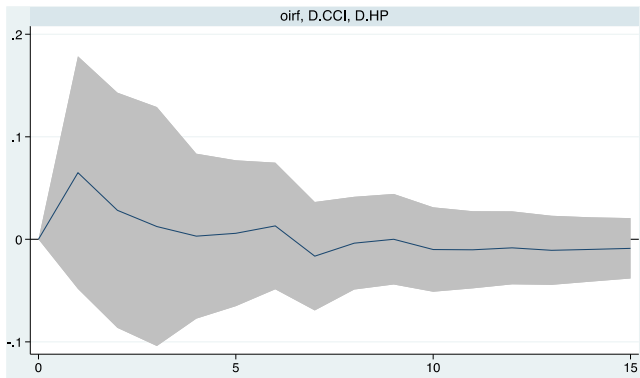


Figure 5. The response of HP to CCI shocks

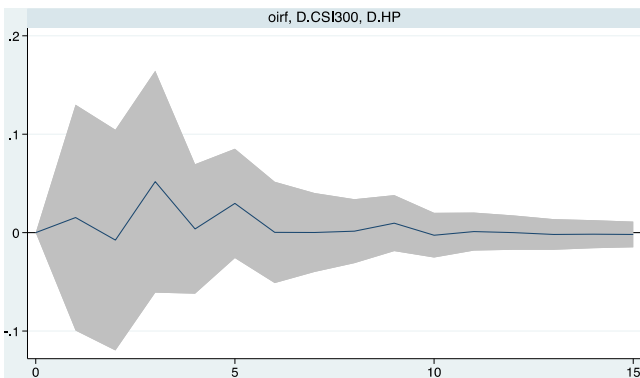


Figure 6. The response of HP to CSI 300 index shock

Figures 4, 5 and 6 show the impact of exchange rates, consumer confidence, and the CSI 300 index on housing prices, respectively. The impulse response of housing price to exchange rate basically remained positive, reaching a maximum in the second period, and disappearing around the fifth period. Both consumer confidence and the CSI 300 index have a positive spillover effect on housing prices in the early stage, and gradually decay after peaking in the first and third periods, respectively.

To further understand the impact of each channel on housing prices, this paper uses variance decomposition to analyze the contributing factors of each variable. As shown in Table 4 below:

Table 4. Decomposition of variance

step	HP	FFER	LPR	EXR	CCI	CSI300
0	0	0	0	0	0	0
1	1	0	0	0	0	0
2	0.9143	0.0325	0.0031	0.0399	0.0097	0.0005
3	0.9024	0.0446	0.0037	0.0379	0.0108	0.0006
4	0.8935	0.0422	0.0142	0.0343	0.0101	0.0058
5	0.8757	0.0528	0.0195	0.0366	0.0098	0.0056
6	0.8734	0.0529	0.0205	0.0365	0.0096	0.0071
7	0.8716	0.0531	0.0215	0.0370	0.0097	0.0070
8	0.8693	0.0546	0.0214	0.0376	0.0102	0.0069
9	0.8691	0.0551	0.0214	0.0374	0.0101	0.0069
10	0.8676	0.0565	0.0213	0.0375	0.0101	0.0070
11	0.8660	0.0576	0.0213	0.0378	0.0102	0.0070
12	0.8652	0.0582	0.0213	0.0380	0.0104	0.0070
13	0.8641	0.0589	0.0214	0.0382	0.0105	0.0070
14	0.8632	0.0595	0.0214	0.0383	0.0106	0.0070
15	0.8625	0.0599	0.0215	0.0384	0.0108	0.0070

As can be seen from Table 4, housing prices play the largest role to explain their own fluctuations, indicating that the fluctuations of housing prices are mainly self-explanatory. However, over time, the contribution of housing prices itself slowly decreased, while the contribution of other variables gradually increased, with the federal funds effective exchange rate being the most explanatory, approaching almost 6% in the 15th period. This shows that U.S. monetary policy can indeed affect China's housing prices to a certain extent.

In addition, from the variance decomposition table, we can see the contribution of the four channels to the housing price. Among them, the exchange rate channel contributed the most to housing prices, reaching almost 4% in the 15th period. It can be seen that, compared with other channels, U.S. monetary policy mainly affects the changes in China's housing prices through changes in the exchange rate. Second, China's Loan Prime Rate contributed 2% to housing prices, indicating that changes in U.S. monetary policy will affect China's market interest rates, which in turn will have an impact on housing prices.

The Consumer Confidence Index has basically stabilized at about 1% of the explanation of housing prices, which has a certain but weak influence, indicating that the U.S. monetary policy can influence China's housing prices through affect China's consumer expectation, though a weak impact. In contrast, the CSI 300 index contributed less significantly to the change in housing prices, at less than 1%.

5. Conclusions

This paper selects the monthly data of China's housing

prices, Federal Funds Effective Rate, exchange rate of yuan against U.S. dollar, China's Loan Prime Rate, CSI 300 index and Consumer Confidence Index from January 2016 to April 2024. The impact of the Federal Funds Effective Rate on China's housing prices has been very rapid, reaching a maximum in the first month and remaining positive over the long term. At the same time, the exchange rate, like the Chinese Loan Prime Rate, had a positive impact on housing prices in the early stage, and then showed a change of direction. The exchange rate, Consumer Confidence Index and the CSI 300 index all had positive spillover effects on housing prices in the early stages. According to the variance decomposition, the channels that cause housing price fluctuations, the exchange rate channel is the most significant. In conclusion, when the monetary policy of the United States begins to adjust, its impact on housing prices is very rapid, and this impact is mainly transmitted to housing prices through exchange rate changes.

As the global economy faces a complex situation, China should adopt a multi-pronged policy approach to reduce the influence of U.S. monetary policy adjustments. First, it is necessary to further strengthen the management and use of foreign exchange reserves to cope with the risks brought about by exchange rate fluctuations. Second, policy makers should also adjust the domestic policy on interest rate in a timely manner to alleviate the negative influence of U.S. interest rate hikes on China's capital market and real estate market. In addition, the government should take measures to stabilize consumer confidence and promote the robust and sustained development of the real estate market, such as supporting first-time home buyers and those with rigid demand through tax cuts and subsidies. These policy measures will help reduce the spillover effect of external economic fluctuations on the domestic real estate market and maintain market stability.

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